REMARKS/ARGUMENTS

The Examiner's attention to the present application is noted with appreciation.

In response to the Office Action mailed December 3, 2003, Applicant has amended the application to more clearly define the invention. Claims 40, 47 and 48 have been canceled and the claims remaining in the case are Claims 25-39, 41-46, and 49.

At page 2 of the Office Action the Examiner has raised certain objections with respect to Claims 30, 31, and 39. More specifically, the Examiner has stated that Claims 30 and 31 fail to further limit the subject matter of the dependent claim, Claim 29. The Examiner has stated that Claims 30 and 31 recite the limitation that the "position of sine and cosine fiducials [are] mathematically linked" in Claim 30 and in Claim 31 that mathematical linking is further defined as by a "π/2 relationship". Applicant has amended Claim 30 so as to delete the language "mathematically linked" and has modified the claim by stating that the fiducials are "transversely spaced apart". This limitation, "transversely spaced apart", clearly overcomes the Examiner's objection. Moreover, the term "longitudinally offset" in Claim 31 also overcomes the Examiner's objection because the mathematical linking, retained in Claim 31, is specifically related to the "longitudinal offset" of the sine and cosine fiducials. It may be true that sine and cosine functions are linked by a π/2 relationship, but nothing precludes use of a mathematical relationship to define the longitudinal position of one fiducial relative to another. The advantages of such positioning or location are set forth below. It may be true that sine and cosine functions when graphed are horizontally (along the x axis of the graph) offset by a distance equal to π/2 but that expresses nothing with respect to the position of fiducials on a patient frame used in a stereotactic localization and immobilization system. There are obviously innumerable ways in which sine and cosine fiducials could be arranged relative to one another on the frame of the invention. Applicant has chosen the particular positioning based on the mathematical link between sine and cosine functions in order to overcome one of the disadvantages of the

prior art localization systems as explained below in traversing the rejection of the claims based on the Wessels reference.

Finally, with respect to Claim 39, the Examiner states that the limitation that the amplitude of the trigonometric waveform fiducials has a varying amplitude is inherent in the term "trigonometric waveform" is respectfully submitted as incorrect. As seen in Fig. 10 of the application, and as is common observation of the waveform of a voltage signal where the voltage is constant, the amplitude may be unvarying. Claim 39 properly further limits the definition of the term "trigonometric waveform" as used in earlier claims wherein the amplitude is unspecified, by reciting that the amplitude may vary. That is a proper narrowing of the term "trigonometric waveform" and a proper dependent claim.

The Examiner has rejected Claims 32 - 39 under 35 U.S.C. § 112, second paragraph, as failing to particularly point out and distinctly claim the subject matter of the invention. Applicant does not agree that Claims 32 - 39 are not clear and precise insofar as defining the fiducials, but in any event has amended base Claim 25 in overcoming the rejection based on the Wessels reference and in the process has overcome the 112/2 rejection. Specifically, Applicant has recited in base claim 25 that there are "at least two fiducials". Obviously, that would include 2, 3, 4, 5, . . . ∞. Claim 25 then proceeds to identify two of those fiducials. Furthermore, the fiducials are defined as a "first one" and a "second one". Thus, Claim 25 includes an indefinite number of fiducials beyond two but identifies two of the fiducials specifically. Claims 32, 33, and 34 define three additional fiducials. These are now identified as the "third", "fourth", and "fifth" fiducials of the base claim "at least two" fiducials. So as to provide proper support for this claim language, Applicant has amended the specification at page 20 so as to identify the fiducials by ordinal numbers. This language is added for clarity and does not add any new matter to the disclosure of the invention as filed. It should now be clear that all of the fiducials referred to in Claims 32 - 39 are additional fiducials that are part of the "at least two" fiducials set forth in Claim 25. Applicant has chosen the term "at least two" in Claim 25 because it is required that there be at least two fiducials in order to implement the invention.

Applicant has not used the term "plurality" because that term by common dictionary definition means a "large number". Webster's Ninth New Collegiate Dictionary, (1984). But even if "large number" means three or more, it would unduly limit Claim 25 and preclude Applicant from claiming his invention in its broadest scope permitted by the prior art. It is therefore respectfully requested that the Examiner withdraw the rejection of Claims 32 - 39 under 35 U.S.C. § 112.

The Examiner objected to Claims 25, 28, 42 and 45 under 35 U.S.C. § 102(b) as anticipated by Wessels. Claim 25 has now been amended to particularly point out and distinctly claim the subject matter of the invention and to thereby overcome the rejection under § 102(b). There are several advantages of the fiducial pattern of the invention that are neither disclosed, taught, nor suggested by the Wessels reference.

First, Claim 25 now clearly recites that there are "at least two fiducials". It is clear from the Wessels reference that there is only a single fiducial comprising a configuration like the letters N, Z, and W. The Examiner states that Wessels teaches a "pattern of markers" which may comprise one transversely constant marker and at least one transverse variable marker. The Examiner then goes on to state that a waveform is interpreted as "an oscillating motion" and that trigonometric, the adjective before the word "waveform", deals with angles and triangles or trigonometric functions such as a sine and cosine. Applicant agrees with this interpretation of the word "waveform" and the word "trigonometric". The Examiner then states that based on that interpretation, the "Wessels W, N, Z, etc. patterns clearly anticipate Applicant's limitation [of] a trigonometric waveform." The Examiner then states that "the contrast marker pattern of N, Z, etc. is inherent to be a continuous array of coupled fiducials. The Examiner is confusing the words "fiducial" and "waveform" used by Applicant in the claims, and the term "contrast marker" as used by Wessels. Applicant has defined the term "waveform" at page 13 of the specification utilizing the dictionary definition and further stating that the term "refers to one period or phase length". In other words, taking a simple example of the sinusoidal waveform, it comprises the wave

shape between the two positive crossings of the X axis. To take one example of Wessels, the letter N, it is understood that the Examiner construes the three straight lines that in the aggregate comprise the letter N as a "waveform". Applicant has used the term "fiducial" as "comprising a repetitive trigonometric waveform". Thus the letter N if a waveform as the Examiner maintains, cannot be a "fiducial pattern" comprising straight lines that are intersecting. Applicant does not use the term "fiducial pattern" used by the Examiner and it is ambiguous. Applicant agrees that the letters W, N, Z can each be construed as a "trigonometric waveform" but clearly in the singular. That is, there is only one waveform formed by any one of these letters, not a "pattern", if the Examiner is using that word to refer to multiple waveforms.

Second, Claim 25 further defines the fiducials as a "repetitive waveform" which is also now defined at page 15 of the specification as referring to a repeating series of the waveform. Clearly, the letters in Wessels do not comprise a repeating series of a waveform even if, as the Examiner argues, each of the letters N, Z and W are trigonometric waveforms. Thus, the claim language distinguishes the Wessels reference by particularly pointing out and distinctly claiming a "repetitive trigonometric waveform". It further distinguishes the Wessels reference because there are two fiducials recited each of which has the "repetitive trigonometric waveform" which Wessels clearly does not show. The Examiner's statement that the individual letters N, Z, etc. are inherently a continuous array of coupled fiducials is not understood. There is only a single letter in each of the alternatives suggested by Wessels. Since as pointed out above, the Examiner states that each of the letters constitutes a "waveform", then there is nothing inherent in Wessels nor would it be obvious to one having ordinary skill in the art to use a plurality of the letters W, N, or Z so as to constitute a "repetitive trigonometric waveform". It is not understood what is meant by the term "continuous array of coupled fiducials" and if the term is used in the manner used by Applicant, Applicant has referred to the existence of more than one fiducial and not a repetitive waveform. Furthermore, the Examiner argues that Wessels states that the alignment system may be in planes about the object to be imaged, but that does not mean that there are multiple alignment systems in a single plane. Wessels obviously meant that one could have an N fiducial on the base of the patient support and

another N in a vertical plane orthogonal to the base plane or perhaps even a third plane that is transverse to the longitudinal axis and orthogonal to the base plane. The Examiner's reference to the series of planes introducing a quality assurance marker is not understood.

Third, one of the highly advantageous features of the use of more than one fiducial in the present invention stems from the positional relationship between the two fiducial waveforms. Specifically, a waveform that is comprised of straight lines, such as the N, Z or W of the Wessels reference has an inherent defect with respect to attaining fine resolution of the stereotactic coordinates. Referring to Fig. 1 of the Wessels reference, if the axial (transverse) image is taken more closely to the apex of the intersecting longitudinal and diagonal lines, the markers on the image will merge into a single indistinct marker. In other words, as shown in the axial image designated as 1-1' in Fig. 1(b) of the Wessels reference, the two circles near the right hand edge of the image, representing the markers on the image from the fiducial, will merge into one another and thus a number of axial planes through that region will be indistinguishable one from another. To overcome that problem, Applicant uses two fiducials which are positioned relative to one another so that when an axial image plane or "x-axis" passes through the apex of one waveform, it will simultaneously intersect the portion of the second waveform in which the phase angle is at, in the preferred embodiment, 45 degrees. Therefore, although the marker from the first fiducial where the axial plane passes through near the apex will be indistinct as in the Wessels reference, the intersection with the second fiducial will be in a portion of the waveform of the second fiducial that is <u>not</u> near the node or apex of the second waveform because of the longitudinal offset and thus provides a more accurate resolution or determination of the z location of the axial plane. This is explained in the specification at page 21.

It is clear that Wessels does <u>not</u> disclose two fiducials, but even if one assumes that it does show two fiducials and further assumes that each fiducial is a "repetitive trigonometric waveform", there is no disclosure or teaching in the Wessels reference that two fiducials are longitudinally offset such that the

above-described superior method of attaining a high resolution is accomplished. Thus, Claims 25 - 39 and 41 - 44, clearly distinguish the Wessels reference and the rejection based on Section 102(b) and on Section 103 should be withdrawn.

Claim 45, also an independent claim, also distinguishes the Wessels reference since it includes at least two stereotactic localization fiducials, each comprising a repetitive trigonometric waveform and the two fiducials longitudinally offset from one another. As pointed out above in the third distinction between Wessels and Claim 25, Wessels does not show two waveforms, let alone two waveform fiducials longitudinally offset.

Finally, Claim 49 is a method claim and has been amended so as to specifically recite two fiducials, and that one of said fiducials has a "repetitive trigonometric waveform" and thus, as in Claim 25, distinguishes the Wessels reference for several separate reasons.

For the reasons set forth above, it is submitted that the objections of Claims 30, 31 and 39 have been overcome. The rejection under 35 U.S.C. § 112 of Claims 32 - 39 has been overcome, and the claim rejections based on Wessels, under either §§ 102(b) or 103 have been overcome. It is therefore respectfully requested that the Examiner allow all of the claims at issue.

If any issues remain, or if the Examiner believes that prosecution of this application might be expedited by discussion of the issues, the Examiner is cordially invited to telephone the undersigned attorney for Applicant at the telephone number listed below.

A check for additional claim fees is attached. Also being filed herewith is a Petition for Extension of Time, with the appropriate fee. Authorization is given to charge payment of any additional fees

required, or credit any overpayment, to Deposit Acct. 13-4213. A duplicate of this paper is enclosed for accounting purposes.

Respectfully submitted,

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